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**Final Health and Safety Plan
for the Source Removal Action at
Trenches T-3 and T-4
(IHSSs 110 and 111.1)**



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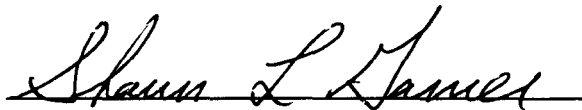
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**FINAL HEALTH AND SAFETY PLAN
FOR THE SOURCE REMOVAL ACTION AT
TRENCHES T-3 AND T-4
(IHSSs 110 AND 111.1)**

Rocky Mountain Remediation Services, L.L.C.

February 1996

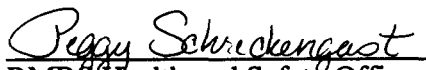
APPROVALS



RMRS Project Manager
Shaun Garner

2-8-96

Date



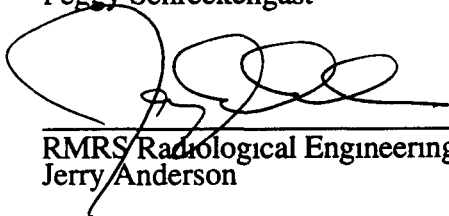
RMRS Health and Safety Officer
Peggy Schreckengast



2/15/96

2-8-96

Date



RMRS Radiological Engineering
Jerry Anderson

2/8/96

Date

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1 0 INTRODUCTION	1
2 0 PROJECT PERSONNEL RESPONSIBILITIES	1
2 1 ALL PERSONNEL	1
2 2 PROJECT MANAGER	1
2 3 HEALTH AND SAFETY SUPERVISOR	2
2 4 SITE SAFETY AND HEALTH OFFICER (SSHO)	2
2 5 FIELD SUPERVISOR	3
2 6 RADIOLOGICAL MONITORING/ENGINEERING	4
2 7 SUBCONTRACTORS	4
3 0 SITE INFORMATION	6
4 0 SCOPE OF WORK	6
4 1 TASK 1 – MOBILIZATION/DEMOBILIZATION	6
4 2 TASK 2 – EXCAVATION AND SOIL PLACEMENT	6
4 3 TASK 3 – SAMPLING	6
4 4 TASK 4 – SOIL TREATMENT	6
4 5 TASK 5 – SITE RECLAMATION	7
5 0 HAZARD ASSESSMENT	7
5 1 CHEMICAL HAZARDS	7
5 1 1 Volatile Organic Compounds (VOCs)	7
5 1 2 Semi-Volatile Compounds	8
5 1 3 Polycyclic Aromatic Hydrocarbons (PAHs)	8
5 1 4 Polychlorinated Biphenyls (PCBs)	9
5 1 5 Metals	9
5 2 RADIOLOGICAL HAZARDS	16
5 3 BIOLOGICAL HAZARDS	21
5 4 PHYSICAL HAZARDS	21
5 4 1 Excavating	21
5 4 2 Sampling	21
5 4 3 Noise Exposure	21
5 4 4 Heat and Cold Stress	21
5 4 5 Personal Protective Equipment	22
5 4 6 Overhead Hazards	22
5 4 7 Traffic Hazards	22
5 5 Task By Task Hazard Analysis	22

TABLE OF CONTENTS continued

<u>Section</u>	<u>Page</u>
6 0 GENERAL HEALTH AND SAFETY REQUIREMENTS	23
6 1 MEDICAL SURVEILLANCE	23
6 2 SAFETY TRAINING	23
6 2 1 40-Hour Basic Training	24
6 2 2 Three-Day On-Site Supervision	24
6 2 3 Radiation Safety Course	24
6 2 4 On-Site Supervisor	24
6 2 5 Site Safety and Health Officer (SSHO)/Health and Safety Specialist (HSS)	24
6 3 SITE-SPECIFIC SAFETY BRIEFING	24
6 4 DAILY/SHIFT SAFETY AND HEALTH MEETINGS	25
6 5 ACCIDENT/INCIDENT REPORTING	25
6 5 1 Rocky Flats Procedures	25
6 6 VISITOR CLEARANCES	26
6 7 HEALTH AND SAFETY LOGBOOK	26
7 0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS	26
7 1 WORK ZONES	26
7 2 PERSONAL PROTECTIVE EQUIPMENT	27
7 2 1 PPE Levels and Requirements	27
7 2 2 PPE Donning and Doffing Guidelines	29
7 3 MONITORING REQUIREMENTS	29
7 3 1 Monitoring Calibration and Documentation	31
7 4 ACTION LEVELS	31
7 5 DECONTAMINATION	31
7 5 1 Personnel Decontamination	31
7 5 2 Equipment Decontamination	32
7 6 WORK PRACTICES	32
7 6 1 Confined Space Entry	32
7 6 2 Spill Containment Plan	32
7 6 3 Dust Control Measures	33
7 6 4 Buddy System	33
7 6 5 Communications	33
7 6 6 Prohibited Activities	33
7 6 7 Illumination	33
7 6 8 Sanitation	33

TABLE OF CONTENTS continued

<u>Section</u>	<u>Page</u>
8 0 EMERGENCY RESPONSE	34
8 1 EMERGENCY SERVICES	34
8 1 1 Emergency Phone Numbers	34
8 1 2	34
8 1 2 1 Directions to the Rocky Flats Occupational Health Medical Facility	34
8 1 3 Avista Hospital	38
8 1 3 1 Directions to Avista Hospital	38
8 2 EMERGENCY RESPONSE PROCEDURES	38
8 2 1 Injury Due to Heat	38
8 2 2 Fire/Explosion	39
8 2 3 Natural Disasters	39
8 3 EMERGENCY EQUIPMENT	39

LIST OF FIGURES

2-1 Health and Safety Project Organization	5
2-2 Project Health and Safety Organization Members	5
8-1 Location of Trench T-3 and T-4 and Proximity to Central Avenue	35
8-2 Directions to RFETS Medical Center	36
8-3 Directions to Avista Hospital	37

LIST OF TABLES

5-1 Physical/Chemical Characteristics of Chemicals of Concern	10
5-2 Volatile Organic Compounds Detected in Subsurface Soils of T-3 and T-4	11
5-3 Semi-Volatile Organic Compounds Detected in Subsurface Soils of T-3 and T-4	13
5-4 Metals Detected in Subsurface Soils of T-3 and T-4	15
5-5 Physical/Chemical Characteristics of Radionuclides	18
5-6 Radionuclides Detected in Subsurface Soils of T-3 and T-4	19
5-7 Task by Task Hazard Analysis	23
7-1 PPE Levels	28
7-2 Monitoring Action Levels	30

1.0 INTRODUCTION

This Site Health and Safety Plan (HASP) addresses the hazards associated with each phase of site operation and establishes guidelines for the safety of personnel during the implementation of field activities associated with the Trenches T-3 and T-4 Source Removal. This work will be conducted as an accelerated action under the *Final Proposed Action Memorandum for the Source Removal at Trenches T-3 and T-4* IHSSs 110 and 111.1. This work will adhere to the regulations and guidelines outlined in the Occupational Safety and Health Administration Construction standard for Hazardous Waste Operations and Emergency Response [29 Code of Federal Regulations (CFR) 1926.65 and the Department of Energy (DOE) Order 5480.9A, Construction Project Safety and Health Management]. The specific activities addressed by this Plan are defined in Section 4.0 of this Plan.

The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards. This Plan outlines the health and safety procedures and equipment required for activities at this site to minimize the potential for exposures of field personnel. Revisions to this Plan require approval from the Project Manager, Radiological Engineer, and the Safety and Health Supervisor.

2.0 PROJECT PERSONNEL RESPONSIBILITIES

The responsibilities and authorities of each individual, relating to health and safety issues, are presented below. Figure 2-1 shows the project's organization.

2.1 ALL PERSONNEL

Each person is responsible for the health and safety of themselves and their co-workers, for completing tasks in a safe manner, and reporting any unsafe acts or conditions to their supervisors and/or the field supervisor. All personnel are responsible for continuous adherence to this health and safety plan during the performance of their work. No person may work in a manner that conflicts with the safety and environmental precautions expressed in this document.

2.2 PROJECT MANAGER

The Project Manager is responsible for overall operations during fieldwork on the site including safety of personnel during site activities. The project manager is responsible for implementation of the HASP and protecting surrounding facilities and any potentially affected communities. The Project Manager's specific health and safety duties include the following:

- Managing the development and implementation of the site-specific HASP,
- Performing periodic onsite inspections to make certain that the HASP is being followed,
- Coordinating with the SSHO on health and safety matters,

- Ensuring that resources are available for all health and safety requirements, and
- Providing the appropriate monitoring and safety equipment necessary for implementing this HASP

The Project Manager has the ability to authorize the following safety-related suspensions

- Temporary suspension of field activities if health and safety of personnel are endangered, pending an evaluation by the SSHO, and
- Temporary suspension of an individual from field activities for infractions of the HASP, pending an evaluation by the SSHO

2.3 HEALTH AND SAFETY SUPERVISOR

The RMRS Health and Safety Supervisor may also be the Site Safety and Health Officer. If this is the case, all responsibilities in Sections 2.3 and 2.4 apply. The Health and Safety Supervisor's responsibilities are as follows:

- Assist in the development and approval of the site-specific HASP,
- Develop health and safety requirements for the project,
- Provide health and safety assistance to the Project Site Safety and Health Officer (SSO),
- Provide assistance to the SSO in addressing health and safety issues which cannot be solved in the field, and
- Conduct weekly health and safety inspections of the project and approve changes to the HASP

2.4 SITE SAFETY AND HEALTH OFFICER (SSHO)

The HASP for the Trenches T-3/T-4 Source Removal is implemented by the SSHO. The SSHO and, ultimately, the Project Manager are responsible for the safe conduct of operations.

The SSHO-specific health and safety duties include the following:

- Assisting the Project Manager and Site Manager in implementing the HASP,
- Reporting to the Health and Safety Supervisor on health and safety matters,
- Providing a copy of the HASP to all field crews,
- Assisting the Site Manager/Field Team with obtaining required health and safety equipment and maintaining equipment on the site,
- Maintaining all site health and safety records and immediately reporting all safety-related incidents or accidents to the Project Manager,
- Directing health and safety activities on the site and conducting staff training and orientation of these activities,

- Conducting required health and safety monitoring including air contaminant, noise, and heat or cold stress monitoring,
- Ensuring that current medical clearance and training documentation is available,
- Monitoring compliance with the HASP and conducting site audits,
- Suspending work or otherwise limiting personnel exposures if this HASP appears to be unsuitable or inadequate, or if the health or safety of personnel is endangered,
- Directing personnel to change work practices if existing practices are deemed to be hazardous to the health and safety of personnel,
- Removing personnel from projects if their actions endanger their health and safety or the health and safety of co-workers, other workers, or the environment, and
- Implementing emergency procedures as required

2.5 FIELD SUPERVISOR

The field supervisor, in coordination with the Project Manager and the SSHO, will be responsible for the implementation of this HASP. This will include communicating site requirements to all on-site project personnel and consultation with the Project Manager and SSHO. The field supervisor's specific health and safety duties include the following:

- Enforcing the requirements of the HASP, including performing daily safety inspections of the work site,
- Stopping work, as required, to ensure personal safety and protection of property, or where life or property-threatening noncompliance with safety requirements is found,
- Observing on-site project personnel for signs of chemical or physical trauma,
- Ensuring site permits are obtained before work begins at each site,
- Informing facility personnel of activities that will be carried out in a particular month,
- Communicating with the Project SSHO about the schedule of work at the facility,
- Ensuring that all site personnel have been given the proper medical clearance, and
- Ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation at the site

2.6 RADIOLOGICAL MONITORING/ENGINEERING

- Implementing radiological guidelines
- Prepare Radiological Work Permit and post the area appropriately
- coordinating and documenting activities to limit radiation exposures to levels that are ALARA
- perform radiological monitoring

2.7 SUBCONTRACTORS

Subcontractors will implement and follow this plan. The following specific responsibilities are included:

- attend site-specific orientation and follow the requirements set forth in this plan,
- provide to SSHO copies of Material Safety Data Sheets (MSDS) for all hazardous chemicals brought on the site, and
- provide copies of all training and medical authorizations required by 29 CFR 1926.65 to the SSHO

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graph TD; PM["RMRS Project Manager  
Shaun Garner"] --> RE["Radiological Engineering  
Jerry Anderson"]; PM --> FS["Field Supervisor  
TBD"]; PM --> SHS["RMRS Safety and Health  
Supervisors  
Tonya Sangaline  
Peggy Schreckengast"]; RE -.-> RCT["Radiological Control  
Technicians"]; FS --> PP["Project Personnel"]; SHS -.-> SSO["Site Safety and Health  
Officer"]
```

[illegible]

3.0 SITE INFORMATION

This HASP supports the source removal for Trenches T-3 and T-4. A description of past investigations, hydrogeological conditions, and contaminants levels found within the trench boundaries is located in the *Final Proposed Action Memorandum for the Source Removal at Trenches T-3 and T-4* IHSSs 110 and 111.1

4.0 SCOPE OF WORK

The following is a summary of the tasks to be implemented during the source removal of Trenches T-3 and T-4. The tasks are described in more detail in the *Final Proposed Action Memorandum for the Source Removal at Trenches T-3 and T-4* IHSSs 110 and 111.1 and in Integrated Work Control Package number T0085182. A task-specific hazard analysis is included in Section 5.5 of this Plan.

4.1 TASK 1 – MOBILIZATION/DEMOBILIZATION

This task involves setting up the support facilities adjacent to Trenches T-3 and T-4. This will include, but is not limited to, setting up appropriate exclusion zone and contamination reduction zone boundaries, staging a decontamination area within the contamination reduction zone, setting up the support zone, mobilization, demobilization, and decontamination (if necessary) of equipment needed to complete this source removal, and final cleanup of the site at the completion of the project.

4.2 TASK 2 – EXCAVATION AND SOIL PLACEMENT

This task includes excavating approximately 5,000 cubic yards of material from the trenches. A track mounted backhoe will be used to excavate the soil from the trenches. The rate of excavation will exceed the rate of thermal desorption processing (Task 4). Therefore the contaminated excavated soil will be placed in roll-off containers next to the trench site, then transported to the thermal desorption unit as needed to keep the thermal desorption process continuous. Debris will be collected in a separate container staged adjacent to the trench. Following verification that the thermal desorption has removed the VOC contamination, the trenches will be backfilled with the treated soils.

4.3 TASK 3 – SAMPLING

Two types of sampling will be conducted for this project. Excavation samples will be used to establish the post-action condition of the soils at the boundaries of the excavation. Post-process samples will be taken to verify compliance with treatment standards. Samples will be collected and analyzed for the VOC contaminants of concern. Since the existing characterization data indicates that metals and radiological contaminants are below cleanup levels in the trenches, no further soil sampling (for excavation purposes) will be done for those constituents.

4.4 TASK 4 – SOIL TREATMENT

Soils will be treated using a low temperature thermal desorption unit. The scope of this HASP does not cover the operation of this unit. A separate HASP will be supplied by the thermal desorption vendor to cover activities specific to setting up and operating this unit.

4.5 TASK 5 – SITE RECLAMATION

Once treated soils are returned to the excavation site, the area will be graded and vegetated with an appropriate seed mixture in order to return this site to a natural condition

5.0 HAZARD ASSESSMENT

5.1 CHEMICAL HAZARDS

Table 5-1 presents the physicochemical characteristics for the chemicals of concern (COCs) at this site and their respective exposure limits. The Permissible Exposure Limit – Time Weighted Average (PEL-TWA) and the Threshold Limit Value – Time Weighted Average (TLV-TWA) are defined as the concentration of a chemical in air to which nearly all workers can be repeatedly exposed, day after day, for a normal eight-hour workday and a 40-hour workweek, without adverse effect. If presented, the exposure limits are the most recent published values. Physical and chemical hazards of volatile organic compounds are included.

The primary exposure pathways of concern for the COCs at this site are inhalation of contaminated particles or vapors and skin absorption. The majority of the COCs are VOCs at normal ambient temperatures and could volatilize. Air monitoring will be performed to reduce the potential for exposure (monitoring requirements are presented in Section 7.3). The COCs could also become airborne in the breathing zone as a result of dust-generating activities. Dust suppression techniques such as water spraying shall be used as required to reduce airborne exposures.

Personnel may be exposed to accidental ingestion of contaminants by hand to mouth contact after contact with contaminated materials. Ingestion of contaminants will be controlled on the site by specific prohibitions (Section 7.6.6) and requirements for decontamination (Section 7.5.1).

Skin and eye contact with some of the constituents at the site may cause skin or mucous membrane irritation. Many of those constituents can be absorbed into the bloodstream through the skin or eyes. Any body area which comes in contact with contaminated materials will be washed with soap and rinsed immediately.

5.1.1 Volatile Organic Compounds (VOCs)

Tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), carbon tetrachloride (CCl_4), methylene chloride (CH_2Cl_2), acetone ($\text{C}_3\text{H}_6\text{O}$), chloroform (CHCl_3), toluene, ethylbenzene and 1,1-Dichloroethene (1,1-DCA) are the major VOCs of concern based on site history and analytical results. VOC data for trenches T-3 and T-4 is shown in Table 5-2. The primary exposure route to these VOCs is inhalation of vapors. Common uses and symptoms of exposure to the VOCs of concern are as follows:

- Tetrachloroethene (PCE) is used as a solvent and a degreaser. Symptoms of inhalation exposure include irritation of the eyes, nose, and respiratory tract, nausea and vomiting. PCE targets the central nervous system (CNS), liver and kidneys.
- Trichloroethene (TCE) is used as a solvent, degreaser, and for chemical synthesis. Symptoms of exposure include headaches, dizziness, nausea, vomiting, respiratory tract irritation and ventricular fibrillation. TCE targets the CNS, liver, and kidneys.

- 1,1,1-Trichloroethane (1,1,1-TCA) is used as a degreaser, solvent, and for dry cleaning DOE coveralls. Symptoms of exposure include headaches, dizziness, incoordination, narcosis and slowed heartbeat. Prolonged skin exposure can result in defatting dermatitis. 1,1,1-TCA targets the CNS, liver, and kidney.
- Carbon tetrachloride (CCl₄) is used as a solvent. It is regarded as highly toxic. Symptoms of inhalation exposure include irritation of the eyes, nose and throat, dizziness, mental confusion and incoordination. It is suspected to be a carcinogen. Carbon tetrachloride targets the CNS, liver, kidneys and lungs.
- Methylene chloride is used as a degreaser, solvent, and extractant. Symptoms of exposure include irritation of the eyes, headache, nausea, dizziness, and poor concentration. Methylene chloride targets the CNS, and is metabolized to carbon monoxide, which then forms carboxyhemoglobin. Methylene chloride is a suspect human carcinogen.
- Acetone is a colorless liquid with a mint-like odor. Symptoms of exposure include irritated eyes, nose, and throat, headaches, and dizziness. Acetone targets the eyes and CNS.
- Chloroform is used as a cleaning agent and solvent and for pharmaceutical purposes. Symptoms of exposure include irritation of the eyes, nose and respiratory tract, dizziness, mental confusion and narcosis. Chloroform targets the CNS, liver, kidney, heart, and is a suspected human carcinogen.
- Toluene is a widely used solvent. It is a clear, flammable liquid with a sweet, pungent odor. Symptoms of overexposure include irritation of the eyes and nose, fatigue, weakness, euphoria, dizziness, headache, dilated pupils, tearing of the eyes, nervousness, insomnia, dermatitis, burning of the skin, and damage to the liver and kidneys. Toluene targets the eyes, skin, respiratory system, central nervous system, liver, and kidneys.
- Ethylbenzene is a colorless liquid with an aromatic odor. Symptoms of exposure include irritated eyes, skin, and mucous membranes, headaches, dermatitis, and narcosis. Target organs include the eyes, skin, respiratory system, and CNS.
- 1,1 Dichloroethene is a colorless liquid or gas (above 89F) with a mild, sweet, chloroform-like odor. Symptoms include irritated eyes, upper respiratory system, skin, CNS depression, and chemical pneumonia. Target organs include the eyes, skin, respiratory system, CNS, liver, and kidneys.

5.1 2 Semi-Volatile Compounds

Semi-volatile organic compounds have been detected within the subsurface soils of Trenches T-3 and T-4. Based on the concentrations detected, the potential of exposure is low and does not warrant a possible risk for exceeding action levels.

5.1 3 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs detected in low concentrations in the surface and subsurface soils at these sites include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and others with similar characteristics. PAHs have low vapor pressures and will not present a vapor inhalation hazard. They may, however, be bound to soil particles and inhaled with airborne dusts. Dermal exposure to these compounds has the potential to cause health effects. Some of the constituents of PAHs are known carcinogens. The health hazards posed by these constituents at this site are low.

5.1 4 Polychlorinated Biphenyls (PCBs)

PCBs have been detected in one sample (6.9 parts per million) within the Operable Unit Trenches area during remedial investigation activities. PCBs are a probable carcinogen. PCBs anticipated at these sites include Aroclor-1254. They are potent liver toxins and have low acute toxicity but can accumulate in fatty tissue leading to delayed health effects. Exposure to these chemicals may occur through the dermal route if workers are in direct contact with soil or materials containing PCBs. Ingestion of PCBs is possible, however, the probability of this route of exposure is greatly reduced by good personnel hygiene practices. Due to the low vapor pressure of PCBs, inhalation of vapors is not a probable route of exposure. Inhalation of PCBs bound to dust particles is possible, but the probability of exposure is low.

5.1.5 Metals

Metals evaluated as potential chemicals of concern have been detected within the subsurface soils of Trenches T-3 and T-4. Based on the concentrations detected, the potential of exposure is low and does not warrant a possible risk for exceeding action levels. Metals identified as potential contaminants of concern are listed in Table 5-4.

TABLE 5-1
PHYSICAL/CHEMICAL CHARACTERISTICS OF CHEMICALS OF CONCERN

Constituent	Maximum Concentration In Soil (PPM)	PEL/TLV Exposure Limit (PPM) ^a	Vapor Pressure (mm Hg @ 68 F)	IDLH (b) (PPM)	Routes of Exposure	Odor Type and Threshold	Symptoms of Exposure
1,1 Trichloroethane (methyl chloroform)	27	350 350	100	700 00	Inhalation Ingestion Contact	sweet/etherish 16-714	Headache, CNS depression, poor equilibrium, irritated eyes, dermatitis, liver damage
1,1 Dichloroethene	0 009	1 5	500	Carcinogen ND ^c	Inhalation Ingestion Contact	sweet 190	Irritates eyes, skin, throat, dizziness, headache, nausea, liver and kidney dysfunction
Acetone	5100	1000 750	180	2500 00	Inhalation Ingestion Contact	sweet/fruity 100 3 6-653	Irritates eyes, nose, and throat, headache, dizziness, dermatitis, CNS depression
Carbon Tetrachloride	700	2/5	91	Carcinogen 200	Inhalation Contact	etherish odor 140-584	Irritates eyes, skin, CNS depression, nausea, vomiting, liver and kidney injury, drowsiness, dizziness, incoordination
Chloroform	8 8		160	Carcinogen 500	Inhalation Ingestion Contact	sweet/suffocating 133-276	Dizziness, mental dullness, anesthetic effects, nausea, disorientation, headache, fatigue, liver enlargement, irritated eyes, skin Carcinogenic
Ethylbenzene	0 87	100 100	7	800	Inhalation Ingestion Contact	oily/solvent 09- 6	Irritates eyes, mucous membranes, headache, dermatitis, narcosis, coma
Tetrachloroethene (PCE)	13000	100 25	14	Carcinogen 150	Inhalation Ingestion Contact	etherish 2 71	Irritates eyes, nose, throat, nausea, flushed face, neck, dizziness, headache, sleepiness, skin redness, liver damage Suspected human carcinogen
Methylene Chloride	2400	500 50	350	Carcinogen 2300	Inhalation Ingestion Contact	sweet 1 2 440	Irritates eyes, skin, fatigue, weakness, sleepiness, light-headedness, numbness and tingling in limbs, nausea Carcinogenic
Toluene	7 6	200 50	20	500	Inhalation Ingestion Contact Absorption	sweet/pungent/ benzene-like 16 37	Irritates eyes and nose, fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, nervousness, muscular fatigue, insomnia, paralysis, dermatitis, liver and kidney damage
Trichloroethene	680	100 50	58	Carcinogen 1000	Inhalation Ingestion Contact	ether/solvent 5-167	Irritates eyes, nose, throat, nausea, flushed face, neck, dizziness, visual disturbances, headache, sleepiness, fatigue, skin redness, giddiness, cardiac arrhythmias, liver damage Carcinogenic

a Exposure Limit=Permissible Exposure Limit (OSHA)/ Threshold Limit Value (ACGIH) as Time Weighted Averages (TWA) The TWA concentration for a normal work day (8 to 10 hours) and a 40 hour work week to which nearly all workers may be repeatedly exposed day after day without adverse effect

b IDLH= Immediate Death or Life Hazard

c ND=Not Determined

TABLE 5-2
VOCs DETECTED IN SUBSURFACE SOILS AT TRENCH T-3

Analyte	Background Mean plus 2 Standard Deviations ⁽⁵⁾	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
Volatile Organic Compounds (mg/kg) ⁽⁵⁾					
1,1,1-Trichloroethane	NA	22	8	36.4	0.006-27(J)
Acetone	NA	21	8	38.1	0.036-5100(B)
Carbon tetrachloride	NA	22	10	45.5	0.004(J)-700
Chloroform	NA	22	6	27.3	0.001(J)-8.8
Ethylbenzene	NA	22	1	4.5	0.009
Methylene chloride	NA	22	16	72.7	0.003(J)-2400(B)
Tetrachloroethene	NA	22	20	90.9	0.002(J)-13,000(D)
Toluene	NA	22	13	59.1	0.022-7.6(J)
Trichloroethene	NA	22	5	22.7	0.002(J)-120

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

TABLE 5-2 (continued)
VOCs DETECTED IN SUBSURFACE SOILS AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
Volatule Organic Compounds (mg/kg) ⁽⁵⁾					
1,1,1-Trichloroethane	NA	18	4	22.2	0.002(J)-2.3(E)
1,1-Dichloroethene	NA	18	1	5.6	0.009
Acetone	NA	18	3	16.7	0.026(J)-120
Carbon tetrachloride	NA	18	1	5.6	0.35(E)
Chloroform	NA	18	2	11.1	0.004(J)-0.77(E)
Ethylbenzene	NA	18	3	16.7	0.012-0.87(D,J)
Methylene chloride	NA	18	3	16.7	0.19(BJ)-8.2(B,J)
Tetrachloroethene	NA	18	11	61.1	0.001(J)-37
Toluene	NA	18	10	55.6	0.003(J)-0.67(J)
Trichloroethene	NA	18	8	44.4	0.02-680

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

TABLE 5-3
SVOCs DETECTED IN SUBSURFACE SOILS AT TRENCH T-3

Analyte	Background Mean plus 2 Standard Deviations ⁽⁵⁾	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
Semi-Volatile Organic Compounds (mg/kg) ⁽⁵⁾					
2-Methylnaphthalene	NA	12	2	16.7	8.0(E)-9.3(E)
2-Methylphenol	NA	12	2	16.7	0.45-0.5(DJ)
4-Methylphenol	NA	12	2	16.7	2.9-3.6(D)
Bis(2-ethylhexyl)phthalate	NA	11	9	81.8	0.051(J)-6.3(D)
Di-n-butyl phthalate	NA	12	2	16.7	1.3-1.7(D)
Hexachlorobutadiene	NA	12	1	8.3	0.17(J)
Hexachloroethane	NA	12	2	16.7	0.37-1.1
Naphthalene	NA	12	2	16.7	0.96-2
Phenanthrene	NA	12	2	16.7	2.5-2.7

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

TABLE 5-3 (continued)
SVOCs DETECTED IN SUBSURFACE SOILS AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations ⁽⁵⁾	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
Semi-Volatile Organic Compounds (mg/kg) ⁽⁵⁾					
2-Methylnaphthalene	NA	16	3	18.8	0.051(J)-0.29(J)
Bis(2-ethylhexyl)phthalate	NA	16	8	50.0	0.038(J)-0.76(B)
Naphthalene	NA	16	2	12.5	0.052(J)-0.15(J)
Phenanthrene	NA	16	4	25.0	0.13(J)-.57

- 1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- 2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- 3) Radionuclide activities less than or equal to zero are considered to be non-detections
- 4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- 5) Background concentrations do not exist and are not applicable for organic compounds

**TABLE 5-4
PCOC METALS DETECTED IN SUBSURFACE SOILS AT TRENCH T-3**

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
PCOC Metals above background (mg/kg) ⁽²⁾					
Arsenic	13 2	11	11	100	1 4(B)-9 2(B)
Barium	289	11	11	100	21 9(B)-251
Cadmium	1 7	11	4	36 4	0 74-0 88
Lead	24 9	11	11	100	3 1-86 4
Manganese	901 6	11	11	100	1 3(B)-1440(B)
Silver	24 6	11	7	63 6	1 1-96 5

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

TABLE 5-4 (continued)
PCOC METALS DETECTED IN SUBSURFACE SOILS AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
PCOC Metals above background (mg/kg) ⁽³⁾					
Arsenic	13 2	16	15	93 8	3 6-11 5
Barium	289	16	16	100	34 4-153
Cadmium	1 7	12	6	50 0	0 35(B)-10 5
Lead	24 9	16	16	100	3 6-59 5
Manganese	901 6	16	16	100	66 5-944
Silver	24 6	14	10	71 4	0 91(B)-68 5

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

5.2 RADIOLOGICAL HAZARDS

Current information about the trenches area indicates the presence of above-background and variable concentrations of the radionuclides Am-241, Pu-239/240, and possibly isotopes of uranium in surface soil. The physical and chemical characteristics of radionuclides are described below and summarized in Table 5-5. Concentration of radionuclides detected at this site are listed in Table 5-6.

Above-background concentrations of Am-241, Pu-239/240, Uranium-233/234 (U-233/234), U-235 and U-238 have been identified in subsurface soils for the trenches locations. Occasional above-background concentrations also have been identified for the radionuclides radium-226 (Ra-226), tritium (H-3), and strontium-89, 90 (Sr-89,90), but the frequency of detection and/or pattern of distribution for these latter nuclides indicates that their presence may reflect the variation of background radioactivity.

Alpha, beta, and/or gamma radiations are emitted by one or more of the radionuclides identified above for surface and subsurface potential contaminants. Alpha radiation is non-penetrating and is an internal hazard (hazardous only if the radioactive material emitting the radiation is taken into the body). Beta radiation is moderately penetrating and is both an internal hazard and an external hazard (the radioactive material is outside the body) to near-surface tissue such as the skin and the lenses of the eyes. Gamma radiation can be highly penetrating and are both an internal hazard and an external hazard to the whole body.

The primary radiological hazard associated with this project is from the alpha radiation that could be associated with an intake of Am-241 or Pu-239/240 through inhalation, ingestion, or injection into a wound. Of these three pathways, inhalation and ingestion would be the most important because dermal absorption would not be a significant pathway for the radionuclides involved.

At the radionuclide concentrations that have been measured at the work area, high radiation doses, which could result in acute radiation effects, would not occur. The primary hazard associated with low radiation doses is a possible increased risk of cancer. An increased risk of adverse hereditary and in utero exposure effects also may be associated with low radiation doses. The risk of intake of radioactive materials through inhalation is low and can be further minimized by avoiding unnecessary soil disturbance and re-suspension. Full face air particulate respiratory protection is required if airborne radioactivity concentrations exceed prescribed threshold levels. The risk of intake through ingestion also is low and can be further minimized by following good hygienic practices such as wearing gloves, washing hands after working in contaminated soil areas, and not smoking, drinking, or eating in and around the contaminated areas.

Table 5-5
Physical/Chemical Characteristics of Radionuclides

Constituent Radionuclides	Maximum Concentration in Soil (pCi/g)	PEL/TLV* Exposure Limit	Physical/Chemical Characteristics	IDLH*	Routes of Exposure	Symptoms of Exposure
Americium 241	12 99	5 rem/yr (ALARA)	Silvery, somewhat malleable radioactive metal	Carcinogen	Inhalation Ingestion Injection	No acute symptoms from low level exposure
Plutonium 239/240	20 78	5 rem/yr (ALARA)	Silvery, radioactive material	Carcinogen	Inhalation Ingestion Injection	No acute symptoms from low level exposure
Uranium 233/234	191 7	5 rem/yr (ALARA) 05 mg/m ³	Silvery, radioactive material	Carcinogen 10 mg/m ³	Inhalation Ingestion Injection	No acute symptoms from low level exposure
Uranium 235	11 5	5 rem/yr (ALARA) 05 mg/m ³	Silvery, radioactive material	Carcinogen 10 mg/m ³	Inhalation Ingestion Injection	No acute symptoms from low level exposure
Uranium 238	113 1	5 rem/yr (ALARA) 05 mg/m ³	Silvery, radioactive material	Carcinogen 10 mg/m ³	Inhalation Ingestion Injection	No acute symptoms from low level exposure

*mg/m³ are for chemical properties

TABLE 5-6
PCOC RADIONUCLIDES DETECTED IN SUBSURFACE SOILS AT TRENCH T-3

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
PCOC Radionuclides above background (pCi/g) ⁽²⁾⁽³⁾					
Americium-241	0 012	12	12	100	0 0007-0 598
Plutonium-239/240	0 018	12	12	100	0 009-3 12
Strontium-89/90	0 747	12	9	75	0 008 ^(J) -0 748 ^(J)
Tritium (pCi/l)	395 211	12	12	100	0 536-333 ^(J)
Uranium-233/234	2 643	12	12	100	0 551-14 4
Uranium-235	0 114	12	12	100	0 0097 ^(J) -0 751
Uranium-238	1 485	12	12	100	0 628-26 4

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

TABLE 5-6 (continued)
PCOC RADIONUCLIDES DETECTED IN SUBSURFACE SOILS
AT TRENCH T-4

Analyte	Background Mean plus 2 Standard Deviations	Number of Samples	Number of Detections ⁽⁴⁾	Percent Detections	Concentration or Activity Range ⁽¹⁾
PCOC Radionuclides above background (pCi/g) ⁽²⁾⁽³⁾					
Americium-241	0 012	16	16	100	0 002 ^(J) -5 91
Plutonium-239/240	0 018	16	16	100	0 003 ^(J) -16 6
Strontium-89/90	0 747	10	10	100	0 002 ^(J) -0 586 ^(J)
Tritium (pCi/l)	395 211	10	10	100	57 8 ^(J) -211 ^(J)
Uranium-233/234	2 643	16	16	100	0 449-191 7
Uranium-235	0 114	16	16	100	0 008 ^(J) -11 5
Uranium-238	1 485	16	16	100	0 543-113 1

- (1) In this column, the J qualifier represents estimated results, the D qualifier represents dilution results, the B qualifier for organics indicates analyte was detected in blank sample, and the B qualifier for metals represents estimated result
- (2) For metals and radionuclides, only potential chemicals of concern (PCOCs) were reviewed and presented in this table
- (3) Radionuclide activities less than or equal to zero are considered to be non-detections
- (4) Radionuclide and metal results less than the background mean plus two standard deviations are considered to be non-detections
- (5) Background concentrations do not exist and are not applicable for organic compounds

5.3 BIOLOGICAL HAZARDS

During field work at this site, personnel may encounter a wide variety of insects including bees, mosquitoes, and spiders. Field personnel are encouraged to use insect repellent when mosquitoes are present.

Stings of bees and wasps may cause serious allergic reactions in certain individuals. Personnel with known insect allergies or sensitivities should notify the SSHO before field work begins. Ticks are parasites that feed on the blood of an animal/human host and can carry several severe diseases, the least severe bringing several days of fever and pain and the worst causing brain damage. Poisonous snakes or spiders may also be encountered at the site. Personnel should check for snakes before walking through grassy or debris-strewn areas. If a person is bitten by snake or spider, the victim shall be transported to the RFETS medical center.

5.4 PHYSICAL HAZARDS

5.4.1 Excavating

Entry into the excavated portions greater than four feet deep will not be permitted unless a modification is made to this HASP. Personnel not involved directly with excavation activities will remain at least twenty feet from the trackhoe while it is in operation and all personnel shall stay at least six feet from the excavation boundary. This area shall be cleared for excavating (for identification of underground utilities) prior to beginning activities.

5.4.2 Sampling

Personnel collecting samples shall adhere to the Personal Protective Equipment (PPE) requirements defined in Section 7.2. Continuous air monitoring will be conducted if sample collection is occurring in PPE that is less than Level B.

5.4.3 Noise Exposure

Work at these sites will be conducted with high noise levels from the operation of heavy equipment. Excessive noise exposure can cause both temporary and permanent effects on hearing. The temporary effects of excessive noise include ringing in the ears, interference with communication, and hearing threshold changes. The effect of long-term excessive noise includes varying degrees of noise-induced loss. Regulations require that hearing protection be used when noise levels exceed 85 decibels (dB) averaged over an eight-hour day. Hearing protection is required at this site for exposures of greater than 85 dB for any length of time. In the absence of instrumentation, an appropriate rule of thumb is that when normal conversation is difficult at a distance of two to three feet, hearing protection is required. However, noise monitoring may be performed to determine employee exposure.

5.4.4 Heat and Cold Stress

Warm temperatures and high humidity could occur during this project. Cold temperatures could also occur during work at these sites. These environmental conditions increase the risk of heat or cold stress during field activities. Monitoring will be conducted for exposure to heat and cold stress with the action levels and work/rest regimen being based on the latest published values by the American Conference of Governmental Industrial Hygienists (ACGIH).

5.4.5 Personal Protective Equipment

The PPE which may be required for some activities (coveralls and respirators) places a physical strain on the wearer. When PPE such as respirators, gloves, and protective clothing are worn, visibility, hearing, and manual dexterity are impaired. The risk of heat stress may increase depending on the level of PPE required.

5.4.6 Overhead Hazards

Special precautions must be taken when operating machinery (such as a trackhoe or Bobcat) in the vicinity of personnel or overhead electrical power lines. Contact with electricity can cause shock, burns, and can result in death. All overhead electrical power lines are considered to be energized and dangerous.

5.4.7 Traffic Hazards

Employees shall exhibit special caution in areas where machinery and vehicles are operating. Due to the operator's restricted vision inside the trackhoe cab, personnel (with exception of the spotter and field supervisor) shall stay at least twenty feet away from the trackhoe during operation. Personnel within the exclusion zone shall wear reflective vests to assist in remaining visible at all times.

5.5 Task By Task Hazard Analysis

Table 5-2 presents a task by task hazard analysis for each location based on the hazards listed in the above sections. The hazard evaluation for each activity is based on the following criteria:

- Low – activities are likely to result in no exposure to hazards
- Moderate – activities are likely to result in hazard exposure below established exposure limits
- High – activities are likely to result in hazard exposures near or above established exposure limits

**TABLE 5-7
TASK BY TASK HAZARD ANALYSIS**

Task (Includes T-3/T-4)	Biological	Chemical	Physical	Radiological
Site Mobilization/Field Screening	Low	Low	Low	Low
Perform Radiological Monitoring	Low	Low	Low	Low
Excavate/Containerize/Cover	Low	Moderate	Moderate	Moderate
Sampling	Low	Moderate	Moderate	Moderate
Managing excavated debris	Low	Moderate	Moderate	Moderate
Transport Roll-Offs (driver)	Low	Low	Low	Low
Management/Backfill of treated soils	Low	Low	Low	Moderate
Decontamination Activities	Low	Low to Moderate	Low	Low to Moderate
Grade/Replant Area	Low	Low	Low	Moderate

6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

All on-site employees who are required to work in the Exclusion Zone (EZ) (see Section 7.1) must obtain health and safety clearance by the SSHO before beginning work at this site. Because of the long duration of this project and the potential for many different employees to be involved, personnel entering the T-3/T-4 work area will be required to have a badge verifying all training requirements have been met for the job being performed. This badge will be distributed and approved by the Project SSHO.

6.1 MEDICAL SURVEILLANCE

Personnel assigned to field activities must participate in a medical surveillance program, in accordance with 29 CFR 1926.65 (f), with subsequent certification by an occupational physician for physical fitness and ability to perform hazardous waste operations, including the ability to wear both an air purifying and a supplied air respirator.

Radiation dosimeters and bioassay testing will be furnished by Rocky Flats as necessary for personnel working on this project.

6.2 SAFETY TRAINING

Employees shall not participate in field activities until they have been trained to a level required by their job function and responsibility. Trainers shall have received a level of training higher than and including the subject matter of the level of instruction they are providing. All training and field experience shall be certified. Training requirements are discussed below.

6 2.1 40-Hour Basic Training

Personnel assigned to field activities must have completed the 40-hour basic health and safety training required under 29 CFR 1910.120 and must have received eight-hour annual refresher training thereafter.

Workers on the site for a specific limited task (i.e., delivery personnel), and who are unlikely to be exposed to levels over the permissible exposure limits, can receive a minimum of 24 hours of instruction on OSHA requirements.

6 2.2 Three-Day On-Site Supervision

Personnel assigned to field activities shall be required to receive a minimum of three days of on-site training under the supervision of a trained and experienced supervisor. On-site time under supervision shall be documented.

6.2.3 Radiation Safety Course

All field employees shall be required to receive a Rocky Flats radiation worker safety course as appropriate for their level of work.

6 2.4 On-Site Supervisor

The on-site field supervisor must have completed the basic 40-hour training course, three days of on-site supervision, and at least eight hours of specialized training on managing hazardous waste operations. The eight hours of specialized training shall include instruction covering the site health and safety program, employee training program, personal protective equipment program, spill containment procedures, and health hazard monitoring procedures and techniques.

6 2.5 Site Safety and Health Officer (SSHO)/Health and Safety Specialist (HSS)

The SSHO and HSS must complete the 40-hour training, three days of on-site supervision, the Department of Energy RCT Core Academics Exam, and training on all health and safety and radiological instruments to be used.

6 3 Site-Specific Safety Briefing

A site-specific safety briefing shall be conducted for all employees, including subcontractors, prior to commencement of field activities. The following topics will be discussed at this meeting:

- Names of health and safety personnel and alternates responsible for site health and safety
- Health and safety organization
- Hazards at the site
- Exposure risk
- Personal protective equipment to be used
- Personnel and equipment decontamination procedures
- Air monitoring
- Emergency procedures

If an offsite vendor is used to perform parts of this project, then the following items will also be discussed

- Employee rights and responsibilities
- General subcontractor, lower-tier subcontractor and/or vendor responsibilities
- Location of the approved Health and Safety Plan
- First aid and medical facilities
- The Hazard Communications Program
- Employee access to exposure monitoring data and medical records
- Construction hazard recognition and the procedures for reporting or correcting unsafe conditions
- Procedures for reporting accidents or incidents
- Fire prevention and control
- Alcohol and drug abuse policy
- Actions for safety infractions and violations

It is the employees responsibility to ensure he/she is familiar with the HASP contents relating to their specific job tasks. If at anytime, an employee does not feel they understand the contents of the HASP, another briefing shall be administered. Once the briefing is completed and employees understand the contents of the HASP, each employee will be required to sign the Safety Compliance Agreement acknowledging they understand and agree to comply with this HASP.

If a new employee who has not gone through the site-specific safety orientation meeting is assigned to the site, the SSHO must present a similar briefing to the new employee before he or she participates in any field activities. All new employees must sign the safety compliance agreement form before beginning fieldwork for this project.

6.4 DAILY/SHIFT SAFETY AND HEALTH MEETINGS

Daily/shift pre-work safety briefings for construction site employees will be conducted. The briefings will address the day's planned activities, reminders of safety responsibilities, and a discussion of any safety concerns. These meetings will be documented.

6.5 ACCIDENT/INCIDENT REPORTING

6.5.1 Rocky Flats Procedures

The Project SSHO will notify the Project Manager of any accidents or incidents that occur during field activities. It is the Project Manager's responsibility to ensure the appropriate personnel are notified of the accident/incident. The Project SSHO will also submit a completed DOE Form F 5484 X for any of the following incidents:

- 1 "Recordable" occupational injuries or illnesses as defined below

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment that requires more than standard first aid.

NOTE: Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered to be injuries.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material.

2. PROPERTY DAMAGE LOSSES of \$1,000 or more are reported as follows. Accidents that cause damage to DOE property, regardless of fault, or accident wherein DOE may be liable for damage to a second party, are reportable if damage is \$1,000 or more. Include damage to facilities, inventories, equipment, and properly parked motor vehicles. Exclude damage resulting from a DOE reportable vehicle accident.
3. GOVERNMENT MOTOR VEHICLE ACCIDENTS resulting in damages of \$250 or more, or involving injury, are reported unless the government vehicle is not at fault, damage of less than \$250 is sustained by the government vehicle, and no injury is inflicted on the government vehicle occupants.

Accidents are also reportable to DOE if

- Damage to DOE property is greater than or equal to \$250 and the driver of a government vehicle is at fault.
- Damage to any private property or vehicle is greater than or equal to \$250 and the driver of a government vehicle is at fault.
- Any person is injured and the driver of a government vehicle is at fault.

6.6 VISITOR CLEARANCES

All visitors to the site must be cleared by Rocky Flats security personnel. Any visitor to the work site will be given a site-specific safety orientation by the SSHO as described in Section 6.3. Prior to entering a work site, visitors will provide the SSHO with documentation of training required by Section 6.2. Any visitors who do not provide documentation will not be allowed into the EZ or contamination reduction zone (CRZ) (see Section 7.1).

6.7 HEALTH AND SAFETY LOGBOOK

A separate health and safety logbook and sign in/sign out log shall be maintained by the SSHO and turned in to the Project Manager once the project is completed. Logged information shall include (1) summary of daily health and safety issues, (2) all measurements taken, (3) types of monitoring conducted, (4) description of unforeseen hazards and steps taken to mitigate hazards, (5) safety infractions, if any, (6) accidents and injuries, and (7) all other significant health and safety items.

7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

7.1 WORK ZONES

The site will be divided into three basic zones: (1) Exclusion Zone, (2) Contamination Reduction Zone, and (3) the Support Zone. The EZ includes areas of high physical, chemical, or radiological hazards. Only authorized personnel are permitted within the EZs. An example of an EZ is an area around any intrusive activity or areas where respiratory protection is required. The EZ will be clearly marked with banner tape, fencing or other high visibility markings.

The Contamination Reduction Zone (CRZ) or decontamination area is the corridor through which all authorized personnel may enter or exit from the exclusion zone. The CRZ contains decontamination equipment and containers for disposable outerwear, etc. The CRZ is located on the upwind side of the EZ. Entrances and exits are clearly marked with high visibility items such as traffic cones, banner tape or other high visibility markings.

The Support Zone (SZ) contains personnel who perform support functions for the physical work and a break area. It is upwind of the CRZ. Managers, spare equipment, etc. are generally located in the SZ. All personnel exiting the EZ must be decontaminated prior to entering the SZ.

7.2 PERSONAL PROTECTIVE EQUIPMENT

7.2.1 PPE Levels and Requirements

PPE will be worn during field activities. The specifications for the required levels of PPE are shown in Table 7.1. The initial levels of PPE for specific activities are shown below. The SSHO may modify these initial levels of PPE in response to additional site information with the written approval from the Project Manager, RMRS Health and Safety Supervisor, and Radiological Engineer.

Level D

- Transporting roll-offs (assumes driver stays in climate-controlled cab during activity)
- Site mobilization
- Perform radiological screening prior to excavation starting
- Perform radiological surveys on personnel and equipment leaving the exclusion zone
- Collect soil samples of treated soil

Modified Level D

- Collect soil samples of excavation boundaries (after excavation is considered complete)
- Decon of equipment used during confirmation sampling
- Backfill the treated soil or other selected clean fill into excavation
- Reclaim the site (grade and vegetate) to conditions comparable to the surrounding area

Level C

- Due to the presence of specific constituents (i.e., 1,1-dichloroethene, carbon tetrachloride, and chloroform), conditions are not appropriate for the use of air purifying respirators. If atmospheric conditions indicate the need for respiratory protection, Level B protection will be used. If Personal Air Sampling data indicates Level C is appropriate, a modification will be made to this HASP.

Level B

- Excavate, containerize, and cover (if applicable) contaminated soil
- Manage excavated debris
- Collect soil samples from the excavated soils
- Field decon of sampling equipment, heavy machinery, and miscellaneous field equipment

**TABLE 7-1
PPE LEVELS**

USEPA PPE LEVEL	REQUIRED PPE
D	<ul style="list-style-type: none"> • Disposable coveralls, cotton coveralls, or work clothes • Safety glasses with side shields • Steel-toed shoes • Disposable shoe covers (when required by RWP) • Hard hat (where overhead hazards exist) • Ear protection (when activities exceed 85dB) • Reflective vests in the excavation exclusion zone during use of heavy equipment • Work gloves if required
Modified D	<ul style="list-style-type: none"> • Tyvek (or equivalent) coveralls <i>or</i> • Saranex (or equivalent) coveralls when working with liquids or sludges <i>or</i> • Coated Tyvek (or equivalent), when working with liquids or sludges • Nitrile gloves (or equivalent) • Safety glasses with side shields • Steel-toed shoes • Disposable shoes covers (when required) • Hard hat (where overhead hazards exist) • Ear protection (when activities exceed 85dB) • Reflective vests in the excavation exclusion zone during use of heavy equipment
C	<ul style="list-style-type: none"> • DOE coveralls or surgical clothing [inner] and • Tyvek (or equivalent) coveralls [outer] <i>or</i> • Saranex (or equivalent) coveralls when working with liquids or sludges [outer] <i>or</i> • coated Tyvek (or equivalent), when working with liquids or sludges [outer] • Inner Nitrile gloves (or equivalent) • Outer Nitrile gloves (or equivalent) • Steel-toed shoes • Disposable shoe covers • Hard hat (where overhead hazards exist) • Full-face respirator with combination dust and organic vapor cartridges • Ear protection (when activities exceed 85dB) • Reflective vests in the excavation exclusion zone during use of heavy equipment
B	<ul style="list-style-type: none"> • DOE coveralls or surgical clothing [inner] and • Tyvek (or equivalent) coveralls [outer] <i>or</i> • Saranex (or equivalent) coveralls when working with liquids or sludges [outer] <i>or</i> • coated Tyvek (or equivalent), when working with liquids or sludges [outer] • Inner Nitrile gloves (or equivalent) • Outer Nitrile gloves (or equivalent) • Steel-toed shoes • Disposable shoe covers • Hard hat (where overhead hazards exist) • Air line or self-contained breathing apparatus • Ear protection (when activities exceed 85 dB) • Reflective vests in the excavation exclusion zone during use of heavy equipment

7.2.2 PPE Donning and Doffing Guidelines

The following guidelines are required when Level C PPE or higher is required for a task. No person shall be allowed to enter the EZ if they are not wearing the appropriate PPE.

Donning Guidelines

- 1 Remove personal clothes in a clean location
- 2 Put on work clothes or coveralls
- 3 Put on required outer protective clothing
- 4 Tape the legs of the coveralls to chemical resistant boots with duct tape
- 5 Put on respirator with cartridges (level C) or facepiece (level B)
- 6 Put on inner-chemical resistant gloves
- 7 Put on outer chemical-resistant gloves
- 8 Perform positive and negative pressure-fit check
- 9 Tape up wrists and ankle seams, if required
- 10 Put on hard hat, if required
- 11 Attach to air line or don self-contained breathing apparatus (level B)

Doffing Guidelines

- 1 Enter CRZ. Receive whole body "frisk"
- 2 Remove tape
- 3 Remove outer boots, if applicable
- 4 Place PPE in drums or plastic bags
- 5 Remove outer gloves
- 6 Remove respirator facepiece
- 7 Remove outer Tyvek or Saranex
- 8 Remove inner gloves
- 9 Wash hands and face
- 10 Clean and sanitize respirator

7.3 MONITORING REQUIREMENTS

Direct-reading real-time monitoring will be conducted in accordance with Table 7-2

- A organic vapor detector (OVD) (photoionization [PID]) with an 11.7 eV lamp (or higher) or a flame ionization detector
- A Bicon Frisk tech with an A-100 probe and a Ludlum Model 31 with a 44-9 probe (or equivalent) will be used to monitor equipment surfaces and PPE for the presence of fixed and removable radioisotopes. A Bicon FIDLER with a G-5 probe will be used to monitor prior to any intrusive activities
- A MiniRam will be used to monitor airborne dust levels of radioactive substances and PCBs
- Heat Stress Monitoring – A wet bulb globe thermometer (WBGT) will be used to monitor environmental factors contributing to heat stress
- Cold Stress Monitoring – Adequate insulated dry clothing must be provided to workers if work performed below 40°F (4°C). At temperatures of 36°F (2°C) or less, it is imperative that employees whose clothing becomes wet be immediately provided with a change of clothing and treated for hypothermia. Special protection of the hands is required to maintain manual dexterity for prevention of accidents

- A sound level meter and noise dosimetry will be used to measure sound levels that workers are exposed to
- Personal sampling pumps will be used to conduct personal integrated sampling for volatile organic compounds. Sampling for volatile contaminants will be conducted during excavation and sampling operations. Monitors will be placed on the trackhoe operator and personnel considered to be most at risk for potential exposure to VOCs.

Samples will be analyzed for all volatile organic compounds of concern. Results will be summarized and employees will receive results in writing within five days of obtaining the results. All sampling records and results will be turned over to RMRS at the completion of the project.

**TABLE 7-2
MONITORING ACTION LEVELS**

Hazard	Instrument	Action Level	Action(s) to be Taken
Organic Vapors	Photoionization Detector	0 ppm >background ¹	Level D, no respiratory protection Level B, respiratory protection
Explosive Atmospheres	Combustible Gas Indicator	> 10% of lower explosive limit	Stop work, notify Project Manager
Dust	MiniRam	< 5 mg/m ³	Respirators not required
Noise	Sound Level Meter	<85 dBA >85 dBA	No hearing protection required Hearing protection required—Noise dosimetry ²
Alpha Radiation (fixed + removable)	NE Technology Electra	<100 dpm fixed + removable > 100 dpm fixed + removable	Continue work Stop work, notify Project Manager and Radiological Engineering
Alpha Radiation (removable)	Ludlum 2929	< 20 dpm/100cm ² removable >20 dpm/100cm ² removable	Continue work Stop work, notify Project Manager and Radiological Engineering
Beta Radiation (fixed + removable)	NE Technology Electra	<5000 dpm fixed + removable >5000 dpm fixed + removable	Continue work Stop work, notify Project Manager and Radiological Engineering
Beta Radiation (removable)	Ludlum 2929	<1000 dpm/100cm ² removable >1000 dpm/100cm ² removable	Continue work Stop work, notify Project Manager and Radiological Engineering

¹Above background sustained in the breathing zone

²If personnel are exposed to noise in excess of 86 dBA average they must be included in a hearing conservation program

7.3.1 Monitoring Calibration and Documentation

The PID, sound level meter, noise dosimeter, Ludlum, Bicon meter and MiniRam will be calibrated and/or checked for performance, at least once each day it is in use, and operated according to the manufacturer's guidelines. Instruments shall be factory calibrated annually or at the frequency recommended by the manufacturer. Sampling pumps shall be calibrated each day before and after sampling. Response checks will be completed as necessary. Calibration records will be maintained with Health and Safety documentation.

Daily instrument readout documentation will be maintained by the SSHO. A report summarizing monitoring results must be written as part of the safety completion report at the end of this project. At a minimum, a record of all breathing zone concentrations, as measured by approved field personnel, is to be included in the monitoring report. Records of exposure will be maintained in the project's Health and Safety file.

7.4 ACTION LEVELS

Acceptable limits for contaminants on this site are those recommended in the most recent Permissible Exposure Limits (PEL) listed in 29 CFR 1910.1000 and/or ACGIH *Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices*. Action levels will be set at no more than half of the more restrictive value, PEL or TLV with instrument response factors and exposure limits for mixtures in mind. It is assumed that contaminants with low vapor pressures would not be detected by the PID. The acceptable limits for radionuclides are listed in 10 CFR 835, *Occupational Radiological Protection*. Minimum action levels for changes in PPE levels and for Stop Work requirements are shown in Table 7-2.

7.5 DECONTAMINATION

Contamination prevention techniques will be used wherever feasible. Monitoring equipment will be wrapped in plastic to prevent possible contamination and to minimize decontamination, to the extent possible, without interfering with their function. The plastic will be discarded as contaminated waste after each day's use.

7.5.1 Personnel Decontamination

Personnel exiting the EZ will be decontaminated before leaving the CRZ. Primary decontamination will be done at the border of the EZ and CRZ. Located between the EZ and SZ, the CRZ provides a transition zone between the contaminated and clean areas of the site.

The SZ is an uncontaminated area from which operations will be directed. It is essential that contamination from the site be kept out of this area.

Disposable coveralls, gloves or outer boot coverings, if worn, will be discarded in the properly labeled container. If cotton coveralls or work clothes are worn, they will be removed prior to leaving the site and street clothes will be donned.

Decontamination for Modified Level D, Level C and Level B will be as follows

- 1 Enter CRZ, receive whole body frisk
- 2 Remove tape used to seal the gloves and boots and place in an appropriate container labeled for PPE
- 3 Remove boot covers and place in the PPE container
- 4 Remove Saranex, Tyvek, coated Tyvek or equivalent coveralls (for Level B remove outer coveralls) in the PPE disposal drum
- 5 Remove outer gloves and place in the PPE container
- 6 Boots will be inspected and checked for further decontamination, as needed
- 7 Remove respirators or face masks and place on the equipment table for decontamination
- 8 Place inner gloves in the PPE disposal drum If cold weather liners are used, place them in a dedicated receptacle for machine washing and subsequent reuse
- 9 Remove inner gloves
- 10 Wash hands and face
- 11 Clean and sanitize respirator

7.5.2 Equipment Decontamination

Equipment decontamination is included in Rocky Flats Environmental Restoration Projects Division Operating Procedures FO 03, FO 04 and FO 06 The handling of decontamination water is found in FO 05 and FO 07

7.6 WORK PRACTICES

7.6.1 Confined Space Entry

Confined space entry is not authorized for this project If it determined during the course of field activities that a confined space entry (i e , entry into the excavation) is required, an addendum to this HASP will be required

7.6.2 Spill Containment Plan

A review of the work to be performed at these sites and the materials to be used shows that spills likely to occur at this site would be limited to decontamination fluids and hydraulic oils Should a spill of hazardous materials occur on the site, the Rocky Flats hazardous materials response team will be summoned, and the Project Manager will be notified

7.6.3 Dust Control Measures

Airborne dust concentrations are to be controlled during all activities which are intrusive into potentially contaminated soils. Water shall be applied, when necessary, to decrease airborne dust generation. Monitoring will be conducted and the action levels found in Table 7-2 will be followed.

7.6.4 Buddy System

The "buddy system" will be used during field work requiring the use of Modified Level D PPE or greater. As part of the buddy system, personnel will not enter or leave the EZ alone.

7.6.5 Communications

Radios for on-site communication will be available. EMAD-6 will be used for communication during the duration of this project.

7.6.6 Prohibited Activities

The following activities are prohibited:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited except in designated areas. Prescribed drugs should not be taken by personnel on operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Good personal hygiene should be practiced by field personnel to avoid ingestion of contaminants or spread of contaminated materials.
- Smoking will be prohibited within the CRZ and EZ during this project.
- No facial hair which interferes with a satisfactory fit of the mask to face seal is allowed on personnel required to wear a respirator or self-contained breathing apparatus.
- Contact lenses are prohibited in the exclusion zone.

7.6.7 Illumination

Night work will be performed in compliance with 29 CFR 1926.56, *Illumination*.

7.6.8 Sanitation

Potable water and toilet facilities which comply with 29 CFR 1910.120(n) must be available to on-site personnel.

8.0 EMERGENCY RESPONSE

8.1 EMERGENCY SERVICES

Procedures for emergency response are given in Section 8.2. The SSHO shall coordinate emergency response on the site. The following phone numbers and directions shall be posted in a prominent location in the support zone. The SSHO shall confirm the location of and directions to the hospital and medical clinic. Any revisions to this section must be posted and all personnel notified of the changes. Figure 8-1 represents the locations of T-3 and T-4 and the proximity to Central Avenue.

8.1.1 Emergency Phone Numbers

In case of an emergency, the RFETS emergency services must be notified. The emergency number for the medical, fire department, and security force is extension 2911. This number shall be posted next to telephones at the site.

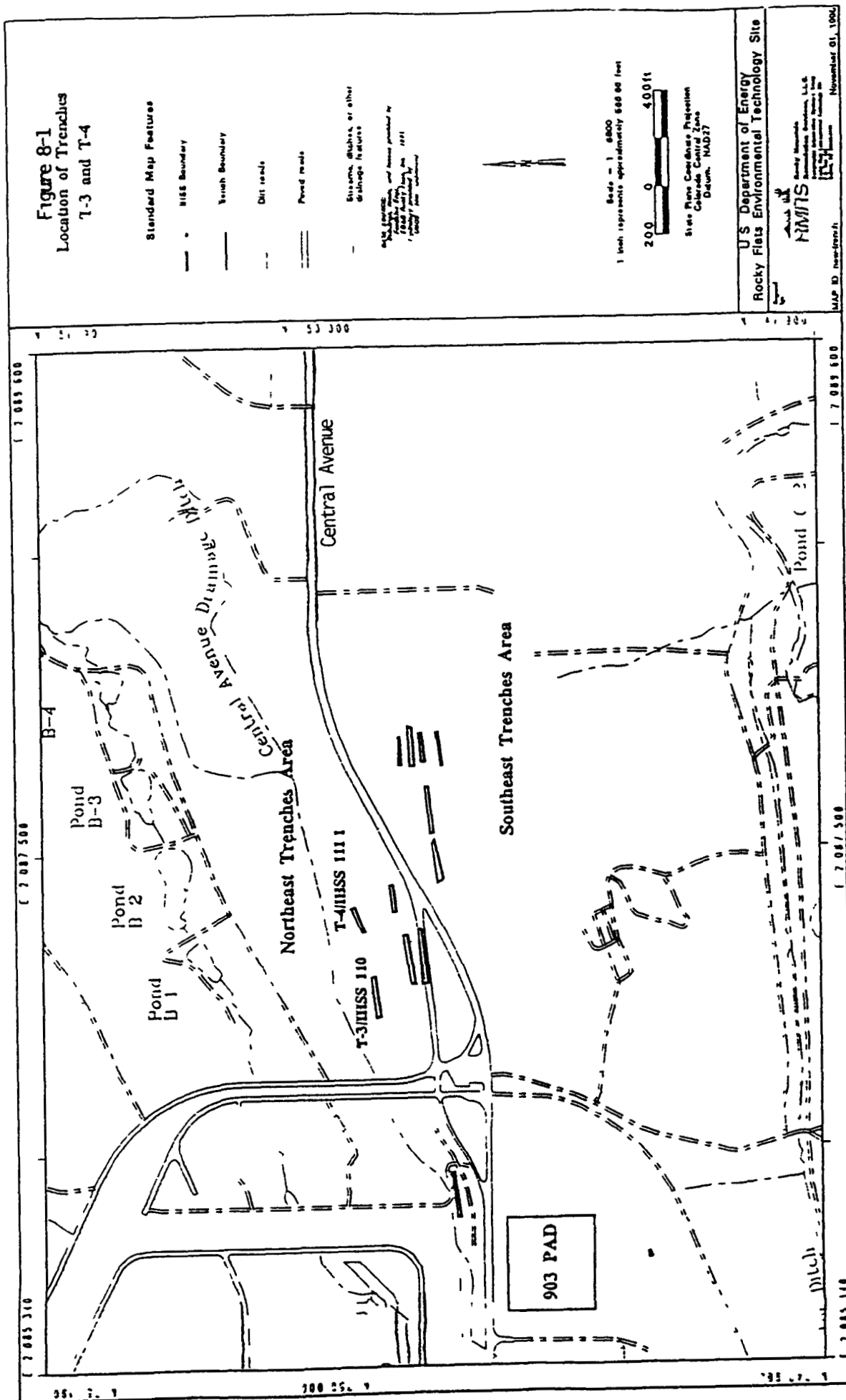
**ALL LIFE THREATENING EMERGENCIES:
DIAL EXTENSION 2911**

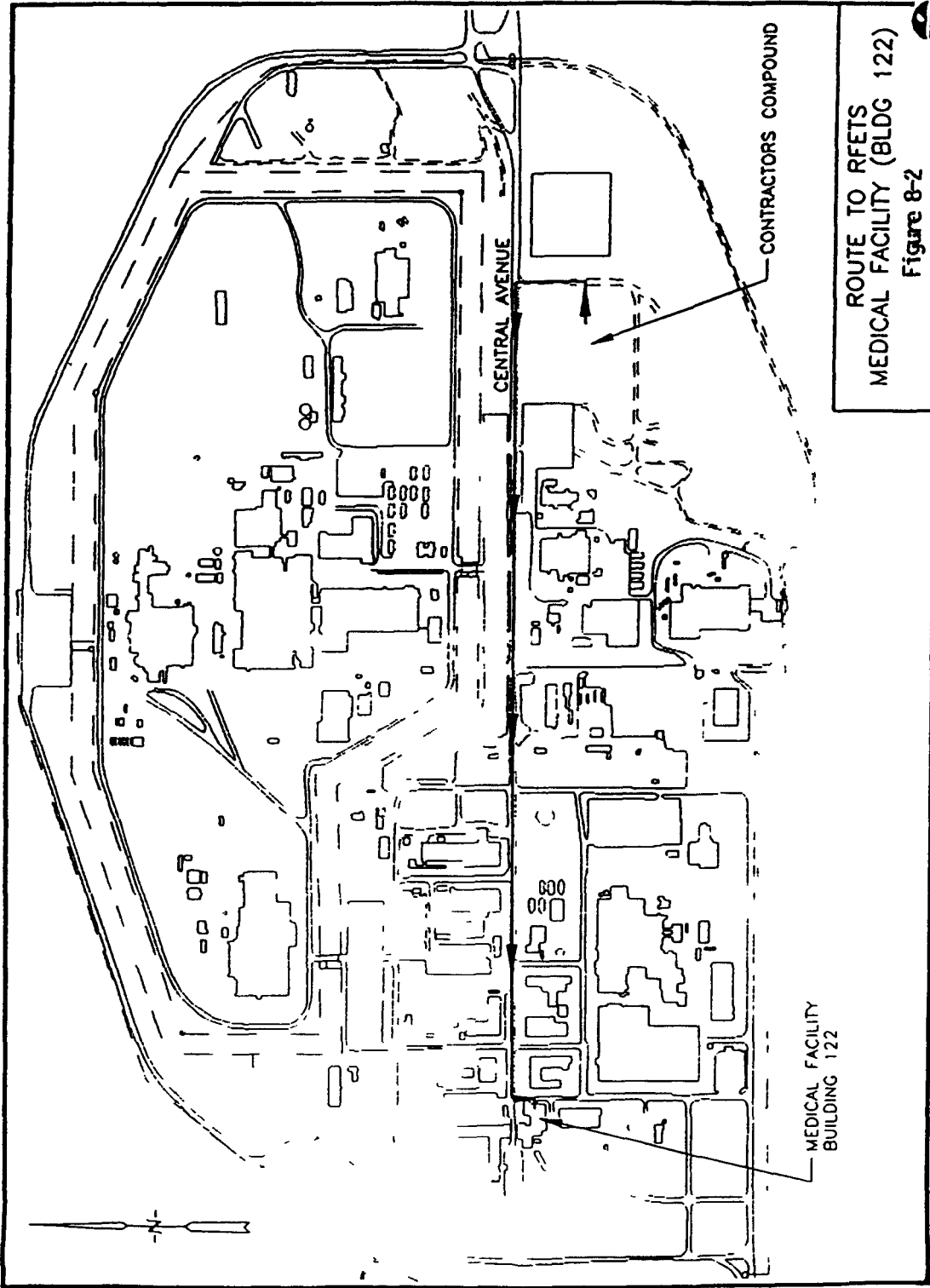
8.1.2 Rocky Flats Occupational Health Medical Facility (Building 122)

The Rocky Flats Medical Facility in Building 122 is to be used for medical injuries and emergencies. Depending on the seriousness of the injury, injured personnel may also require care by Avista Hospital. The need for Avista Hospital will be determined by Occupational Health and the individual injured. The medical facility also can hold any contaminated personnel (i.e., radiological) with injuries until decontamination can be performed.

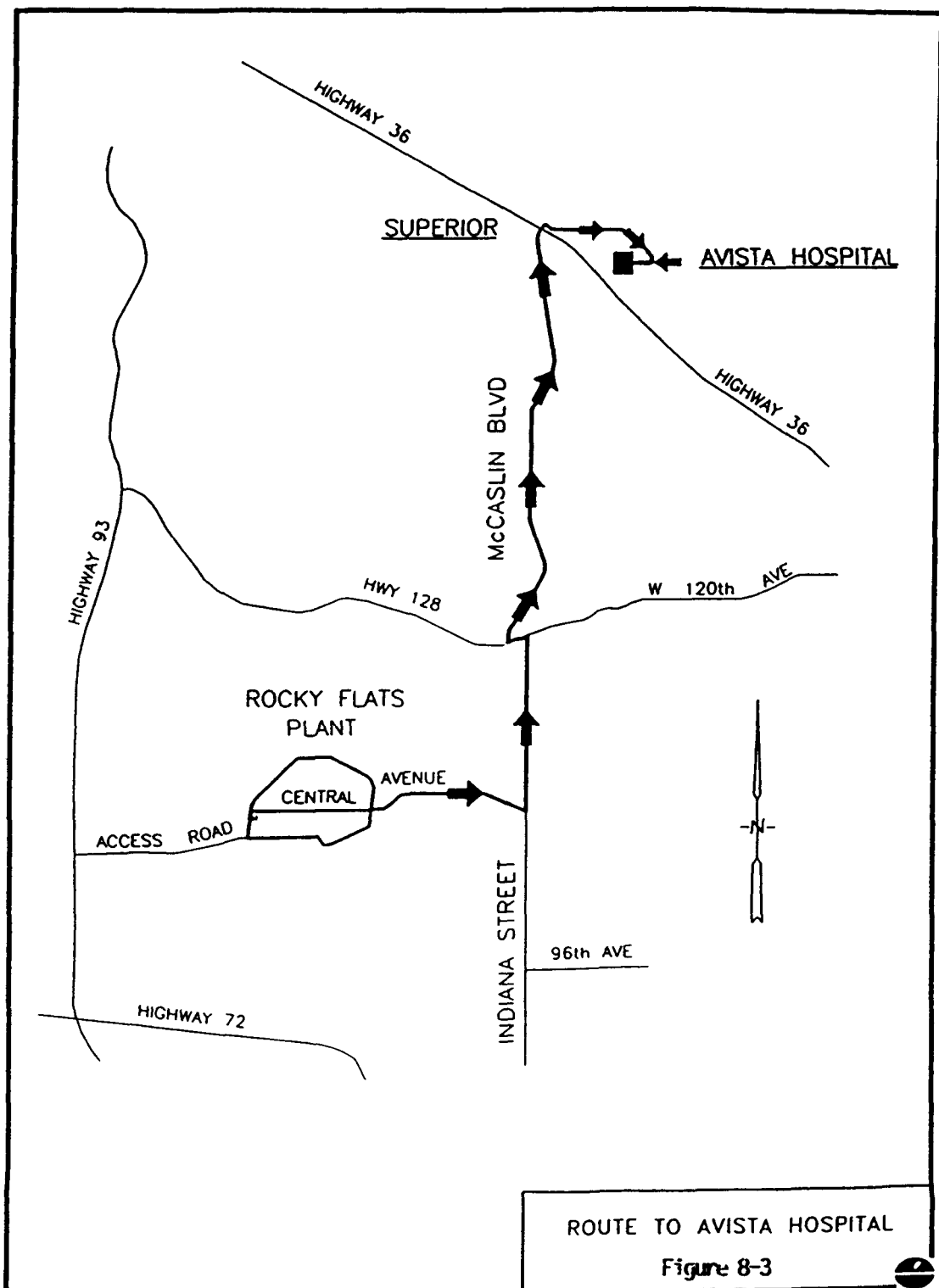
8.1.2.1 Directions to the Rocky Flats Occupational Health Medical Facility

From the Contractor's yard, go north to Central Avenue and turn left (west) onto Central Avenue. Continue for approximately 1.25 miles. Building 122 will be on the left (south) side of the guard building to the right. See Figure 8-2.





ROUTE TO RFETS
MEDICAL FACILITY (BLDG 122)
Figure 8-2



8.1.3 Avista Hospital

Avista Hospital is to be used for all non-emergency medical incidents requiring medical attention for subcontractor personnel

8.1.3.1 Directions to Avista Hospital

From the Contractor's yard, go north to Central Avenue and turn right (east) onto Central Avenue. Continue east to the east entrance of plantsite, turn left (north) onto Indiana Street. At the intersection of Indiana Street and Highway 128, turn left (west). Continue west on Highway 128 to the intersection of McCaslin Boulevard. Turn right (north) onto McCaslin Boulevard. Continue north on McCaslin past the intersection with Highway 36 to Dillon Road. Turn right (east) on Dillon Road and continue to South 88th Street, then turn right (south). Turn right (west) on Health Park Drive and continue until it ends. The hospital is located at 100 Health Park Drive. See Figure 8-3.

8.2 EMERGENCY RESPONSE PROCEDURES

The Project Manager, with assistance from the SSHO, has responsibility and authority for coordinating all emergency response activities until proper authorities arrive and assume control. In the event that evacuation of the project area is necessary, the support zone will be the assembly area. All personnel will be accounted for using the Radiation Work Permit (RWP).

8.2.1 Injury Due to Heat

If a person is suffering from heat exhaustion (profuse perspiration, normal body temperature), the following procedures will be taken:

- 1 Remove the person to a cooler, shaded area
- 2 Give eight ounces of Gatorade every 15 minutes for three or four doses
- 3 Allow the person to rest
- 4 If the person is suffering from cramps, press warm, wet towels over the cramped area

If a person is suffering from heat stroke (skin hot and dry, very high body temperature), the following procedures will be taken:

- 1 Decontaminate the victim
- 2 Cool the victim quickly by soaking the person in cool but not cold water, sponging the body with rubbing alcohol or cool water, or pouring water on the body
- 3 Reduce the body temperature to a safe level (about 102 to 105°F)
- 4 Observe the victim for ten minutes. If the body temperature starts to rise again, cool the victim again
- 5 Transport to hospital for medical attention as soon as possible

8.2.2 Fire/Explosion

In the event of a fire or explosion, the Rocky Flats Fire Department should be summoned immediately. On arrival, the Project Manager or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials at the site.

If it is safe to do so, site personnel may remove or isolate flammable or other hazardous materials which may contribute to the fire. Otherwise, immediate evacuation of the area is indicated.

Fire extinguishers are provided at the site.

In the event of an explosion, all personnel shall be evacuated and the fire department notified. No one shall re-enter the area until it has been cleared by explosives safety personnel.

8.2.3 Natural Disasters

Natural disasters may occur at the site due to weather. These include lightning and high winds.

- 1 Lightning – Persons should not work in open areas, near trees or other equipment outside during lightning storms. Stop work until storm passes. If possible, clear the site until storm passes.
- 2 High winds – If high winds are forecast, the site should be cleared before the winds become hazardous. Workers should be instructed to go to an appropriate shelter. If winds are sustained at 35 miles per hour, work will be stopped until the wind subsides, or until authorization from Kaiser-Hill is given to resume field work.
- 3 If an evacuation is called, account for all persons before leaving the site.
- 4 Notify the Project Manager of any work stoppage due to lightning and high winds.

8.3 EMERGENCY EQUIPMENT

This equipment will be stored at appropriate locations selected during site mobilization. Emergency response equipment shall be moved from one site to another based on changing locations of field activities in order to ensure that emergency equipment is available in the work area.

- Fire extinguishers (10 lb A/B/C)
- First aid kit. At least one industrial first aid kit will be provided and maintained fully stocked in the support zone.
- Gatorade or equivalent
- Extra full set of PPE
- Emergency eye wash stations